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Assessment of the current situation of populations of *Vicia sativa* L. species in different regions of Azerbaijan

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Abstract
Assessment of the age periods and ontogenetic age status of high-yielding Vicia sativa L. species in the ontogenesis of Vicia L. genus of Fabacea Lindl. Famlies was carried out. Juvenile and immature individuals were not found in the ontogenesis, an increase in the number of subsenil and senile individuals were observed, and young, old, transitional cenopopulations were identified. However, the majority of the studied populations were transitional type (Δ = 0.34-0.54; $\dot{\omega}$ = 0.56-0.67). Only evolving vitality was observed under assessing of vitality, and one-way irreversible variables were observed under studying the dynamics of development. The results are very dangerous for the Vicia sativa species; indicating the deterioration of the population and the underdevelopment of the cenosis.
Ddevelop conservation measures have been recommendedtaking into account these qualities of valuable fodder plant Vicia sativa L. in the development of livestock in agriculture, the creation of a strong fodder base, the improvement of natural fodder and arable lands, the creation of high-yielding and high-quality hayfields.

Keywords: ontogenez, microassociation, dominant, protein

Introduction
Legumes genus includes *Vicia sativa* L. species (*Fabaceae* Lindl. family) is rich by high forage species are special importance in improving the natural forage and arable lands. 200 species of this genus distributed in the world, 48 are found in the Caucasus, and 44 species - in the flora of Azerbaijan, of which one species is cultivated in culture [1, 13]. Species of the *Vicia* L.genus are plants with high chemical value due to their chemical composition [5, 12, 16, 17]. As well known, the high content of protein and fat in legumes and the low content of cellulose indicate theire great nutritional value. At the same time, their high content in grasses in lowland, mountain-forest and arid mountainous areas, hayfields and pastures increases the coefficient of fodder value of pastures and hayfields. These legumes often grow in a certain percentage of grass cover of arable land and pastures. However, in the phytocenoses of the grass cover of the forests and steppes is often possible to come across micro-associations of leguminous plants, which can make up 75-85% of the mixture in the lowland and mountain-forest zones. The dominance of these micro-associations are mainly legumes.
Creation of high-yielding and high-quality hayfields is possible by cultivating species, which should be considered one of the main tasks in agriculture. The *Vicia sativa* species of genus is widespread in all areas from the plains to the middle mountains in Azerbaijan. These plant has been cultivated since ancient times. As a weed grows in vineyards, orchards, on the edges of fields, on raw soils, in the fields of rhubarb, barley and other crops. It is found at an altitude of up to 1800 m above sea level. It is considered a winter plant because its seedlings emerge in autumn under natural conditions. The perennial legume is the best fodder plant. Due to the value of the feed and the amount of protein is similar to red clover and black clover.
The seeds contain up to 30% of crude protein. It is widely used in the feeding of poultry. It is mixed with coarse fodder and given to cattle and eaten y them with great pleasure. *Vicia sativa* along with representatives of the cereal family is well eaten in the form of wet mass and dry graby all types of livestock ss. Gives a bitter taste when eaten separately. The legume- oats, legume-barley are eagerly eaten by the sheep. The amount of cyanic acid in the form of glucose in the seeds of sown larvae may be 0.027-0.067%, and in the green mass may be in 10-15 times less according to the references source. The amount of hydrocyanic acid is completely reduced by the end of the full development of the plant [12, 14].
The purpose of the study was to assess the cenopopulations of one of the most valuable species of forage grass *Vicia* L. genus - *Vicia sativa* species in different botanical and geographical regions, especially in irrigated lowlands of the Azerbaijan Republic.

Materials and Methodology
As objects of research were selected botanical-geographical regions of Azerbaijan - Lankaran and Kurdamir in 2013-2015 years. Phytocenological researches in the mountainous part of Lankaran in the *Viciaetum pannonica-Festucosum rupicola* association, in the relict forests of the area in the *Viciaetum cassubica* association and in *Lagonychieta-Alhagietum-Cynodonosum* formation in the Kurdamir districts were carried out.
The main purpose of the research was to assess the cenopopulations of the *Vicia sativa* L. species in these phytocenoses composed of legumes.
Assessment of cenopopulations of the *Vicia sativa* L. species was given up to the ranks of formation and association in plantation types during the research [3,4]. Some demographic indicators - recovery index, replacement and age index, types of cenopopulations, structure of life were identified during the assessment of cenopopulations of the studied species. The demographic structure was determined by the relationship of different ontogenetic age

groups, morphometric indicators of individuals were taken into account under assessing the viability of the studied species [7, 8].

The methods developed by T.A. Rabotnov, A.A. Uranov and their schools were used for study the structure of the ontogenesis of the cenopopulation with distribution of *Vicia sativa* L. species [15, 19]. Population types have been identified on the basis of the maximum criteria of S.C. Ibadullayeva, Z.M.Ismayilova, L.A.Jivototovsky, O.V.Smirnov and L.B. Zaugolnov's principles [6, 9, 11, 18]. The main indicators of the viability of the cenopopulation were assessed according to the classification of A.R. Ishbrid and Yu.A. Zlobin [10, 20]. The vitality of cenopopulation (Q-vitality) is classified according to Yu.A. Zlobin as follows [20]:

1. Developing cenopopulation - (Q= 1/2 (a + b)> c;
2. Equilibrium cenopopulation - (Q = 1/2 (a + b) = c;
3. Cenopopulation in crisis - (Q = 1/2 (a + b) <c.

Vitality was calculated using the index of vitality (I_Q) in development, balance and crisis according to A.R. Ishbridi [10].

The age status of the cenopopulations of the studied species was determined based on the young, middle-aged and elderly conditions of the generative organs in determining the viability of the population [15, 19]. The age status of the cenopopulation was studied on shoots of different ages as a result of random selection based on morphometric indicators.

413 individuals were observed under studying the ontogenesis of *V.sativa* species. The total area of the sample sites, the number of encounters were taken into account, and the results were converted to quantity /ha or quantity q/m^2 during the calculation of individuals. Frequency of species in cenopopulations depends on the size of the selected sample sites.

Age condition (seedling-c, juvenile-j, immature-im, virginil-v, young generative-g_1, middle generative-g_2, old generative-g_3, senil-s, subsenil-ss, endangered plant-sc) was determinated by A.A.Uranov's scheme [19]. In this case, the ontogenetic status of the species was determined, individuals were categorized according to age, and elongated transects were constructed at each sample site to study the age structure. 150 sample sites on 1m^2 area were allocated for every 30-50 m, depending on relief [2]. The age density of all individuals in the sample plots was calculated by age, and the density of cenopopulation was estimated at 1m^2, using population indicators such as recovery index I_r, replacement index I_{rp}, age index Δ, efficiency index ώ [10, 15, 19, 20].

Reproductive capacity of individuals of the *Vicia sativa* L. species in phytocenoses, potential seed yield, seeds biomass, biomass of flower group, height, density of individuals, the share of young individuals has taken into account under geobotanical research [2, 11, 14].

Vicia sativa L. studied at the cenopopulation level. Thise plant can produce high-yielding and high-quality haylands from the species, which is important for agriculture and livestock development.

Results and Discussion

Vicia sativa L. is an annual or biennial plant up to 80 cm tall, with a quadrangular, curved or straightened trunk. The trunk is covered with dense leaves. The leaves end in whiskers. It has 3-8 leaflet. The pinkish-blue flowers are located in the axils of the leaves, one or two. They have spherical and velvety 5-10 seeds. The plant blooms in May and bears seeds in May-June [1, 4, 17].

Phytocenological studies of *Vicia sativa* L. species were carried out in the following formations:

Studies of *V.sativa* L. species in I CP was carried out in meadow steppes plantation type, in moutley grass-legume-grain meadow steppes formation class, *Thymuseto-Viciaetum-Festucosum* formation group, *Viciaetum pannonica-Festucosum rupicola* association in 2013-2015 years on territory of the summer pastures No. 8 of the Astara districts located in the mountain forest-meadow lands of the mountainous part of Lankaran,.

Study of II CP was carried out in forest belt vegetation (forest vegetation type), in meadows formation class formed by legumes and monodominance of perennial grasses in moist relict forests, also in *Viciaetum* formation and *Viciaetum cassubica* association in the relict forests of Lankaran territory (Hirkan National Park) in 2013-2015 years. The total projective cover of the formation was 75-90%. Here, the abundance of *Vicia sativa* L. species was estimated at 1 point.

Researches in CP III were carried out in the form of meadow-grass vegetation type (introzonal vegetation), semi-bush-legume-grain-grass meadow formation class, *Lagonychieta-Alhagietum-Cynodonosum* association in 2013-2015.

Spring seedlings predominated during the development period, which is of great importance in the cenopopulation. 413 individuals were observed under studying the structure of the ontogenesis of the cenopopulation with distribution of *Vicia sativa* L. species (Table 1). Their cenopopulations were observed in all age groups in the studied associations.

Table 1: The structure of the ontogenesis of the cenopopulation with widespread of *Vicia sativa* L. Species

CP	Ont. Years	Ontogenetic age conditions								∑
		J	im	v	g_1	g_2	g_3	ss	s	
I CP	2013	4	4	7	11	15	18	6	-	65
	2014	-	5	6	10	14	14	9	7	65
	2015	3	-	6	9	4	4	2	6	34
II CP	2013	6	7	6	10	11	11	7	4	62
	2014	-	-	5	9	8	8	6	4	40
	2015	6	8	8	4	5	4	-	-	35
III CP	2013	-	7	6	8	7	6	-	2	36
	2014	6	7	8	8	9	7	2	-	47
	2015	4	-	4	8	4	4	3	2	29
	∑	29	38	56	77	77	76	35	25	413
	%	7	9,2	13,5	18,6	18,6	18,4	8,5	6	99,8

Complete and incomplete ontogeny of *Vicia sativa* L. species was observed in CP I, II and III as can be seen from Table 1. Thus, in CP I juvenile in 2014, immature

individuals in 2015 were not found, and an increase in the number of dead individuals (ss + s = 9 + 7) was observed.
Juvenile or immature individuals were not found in CP II in 2014 either., The growth rate of individuals in 2015 was also low in CP III and the decrease between g_1 and g_3 was found to be 50% (g_1 = 8; g_3 = 4). As a result, the absence of juvenile and immature individuals in ontogeny, the increase in the number of subsenil and senile individuals showed that cenosis was underdeveloped and the condition of the population was deteriorating.
Young, old and transitional cenopopulations of *Vicia sativa* L. were identified during the study (Table 2).
The type of cenopopulation is young (Δ-ώ = 0.32-0, 57) in CP II in 2015 (Δ-ώ = 0.22-0.47), in CP III in 2014 as a result of the development of juvenile and immature individuals. Old type (Δ-ώ = 0.56-0.63) cenopopulation was found in CP II in 2014.

Table 2: Assessment of cenopopulations of *Vicia sativa* L. Species

CP	Ont. period	I CP			II CP			III CP		
		2013	2014	2015	2013	2014	2015	2013	2014	2015
Growth phases of ontogenez, by %	J	6,1	-	8,8	9,7	-	17,1	-	12,8	13,8
	Im	6,1	7,7	-	11,3	-	22,8	19,4	14,9	-
	V	10,8	9,2	17,6	9,7	12,5	22,8	16,7	17	13,8
	g_1	16,9	15,4	26,5	16,1	22,5	11,4	22,2	17	27,6
	g_2	23,1	21,5	11,8	17,7	20	14,3	19,4	19,1	13,8
	g_3	27,7	21,5	11,8	17,7	20	11,4	16,7	14,9	13,8
	Ss	9,2	13,8	5,9	11,3	15	-	-	4,2	10,3
	S	-	10,8	17,6	6,4	10	-	5,5	-	6,9
Indexes	$İ_r$	0,34	0,29	0,53	0,59	0,20	1,7	0,62	0,87	0,62
	$İ_{rb}$	0,30	0,20	0,36	0,44	0,14	1,7	0,56	0,81	0,48
	Δ	0,46	0,54	0,45	0,49	0,56	0,22	0,34	0,32	0,46
	ώ	0,67	0,64	0,56	0,57	0,63	0,47	0,67	0,57	0,59
CP type	Young						+		+	
	Transition	+	+	+	+			+		+
	Old					+				

The presence of an older type of cenopopulation in CP II in 2014 indicated that the population was unsatisfactory. The majority of the studied populations were transitional type (Δ = 0.34-0.54; ώ = 0.56-0.67). Decrease in the number of individuals in Cenopopuls II and III is an indication of a future decline of feed stocks of *Vicia sativa* L. have been shown. The dynamics of development was also observed during the assessment of cenopopulations of *Vicia sativa* L. during the research years.
Biggest changes in the population waves of the *Vicia sativa* L. species were observed in the relict forests of Lankaran in the *Viciaetum cassubica* association (II CP) (Figure 1). in 2013-2014Populations in this association with normal fluctuations were observed and with sharp fluctuations in 2015. The age spectrum was fragmented, resulting in an incomplete population as a result of the displacement of the population wave. This is due to the instability of the cenopopulation indicators in the study area and the result of the compression of the species during competition. The density of cenopopulations decreases and young individuals die as a result of intensive grazing. As a result, an increase in the number of older individuals leads to the disappearance of the cenopopulation.

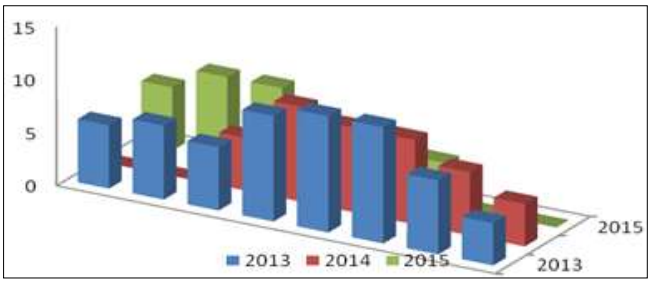

Fig 1: Dynamics of development of *V. sativa* L. species in *Viciaetum cassubica* association

Succession changes can occur if timely measures are not taken as have shown studies. One-way irreversible variables are very dangerous for the *Vicia sativa* species. Maximum recovery index (I_r = 0.87) in the territory of Kurdamir district in the *Lagonychieta-Alhagietum-Cynodonosum* formation (III CP) in 2014, and the maximum density (D = 1.3) in I CP in 2013-2014. Only developing viability was observed during the study years, when assessing the viability of *Vicia sativa* L. cenopopulations (Table 3).

Table 3: *Assessment of the viability of the Vicia sativa L.species*

CP	Years	*The percentage of individuals in the CP*			I_Q	Q	*The vitality of CP*
		A	b	c			
I CP	2013	70	23	9	5,1	18,6	Being developed
	2014	58,4	16,9	24,6	1,5	38	Being developed
	2015	50,1	26,4	23,5	1,6	38,2	Being developed
II CP	2013	51	30,7	17,7	2,3	41	Being developed
	2014	62,5	12,5	35	1	37	Being developed
	2015	37,1	62,7	0	50	50	Being developed
III CP	2013	55	27,6	17	2,4	41	Being developed
	2014	45	51	4,2	10,6	48	Being developed
	2015	55	27,6	17,2	2,4	41	Being developed

Individuals in all populations during the study years were characterized by an average rate of development as clear from table 3. Violations were observed only in the territory of Lankaran in 2015 in the *Viciaetum cassubica* association, in the territory of Kurdamir districts in the *Lagonychieta-Alhagietum-Cynodonosum* association in 2014. As a result, it became clear that these populations are vegetative. This indicates the vegetative recovery of populations in the same year.

Conclusion

The study of the age periods of *Vicia sativa* L. at the level of cenopopulation allows us to study at what age is most often eaten by cattle. This is important for the development of livestock in agriculture. Number of individuals in cenopopulsions an increase in the number of subsenil and senile individuals, the transition of the majority of the population, the observation of only the developing life, the occurrence of one-way irreversible changes in the dynamics

of development will lead to a decrease in feed stocks in the future have been revaled during the assessment of *V. sativa* species cenopopulations in *Viciaetum pannonica-Festucosum rupicola*, *Viciaetum cassubica* and *Lagonychieta-Alhagietum-Cynodonosum* formations in Lankaran and Kurdamir districts of Azerbaijan.

Vicia sativa L. is cultivated on the farm, especially in irrigated lowlands, as one of the most valuable fodder crops in improving agricultural lands, creating high-yielding and high-quality hayfields, a strong fodder base, and developing livestock. Protective measures for protect of the naturally occurring cenoses of *Vicia sativa* L., as well as to use this species extensively in the creation of a strong fodder base in the Absheron Peninsula of Azerbaijan have been recommended.

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